CALCULATIONS

USED IN

CANE-SUGAR FACTORIES.

A PRACTICAL SYSTEM OF CHEMICAL CONTROL FOR LOUISIANA SUGAR-HOUSES AND OTHER CANE-PRODUCING COUNTRIES.

BY

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FIRST EDITION.

FIRST THOUSAND.

NEW YORK:

JOHN WILEY & SONS.

LONDON: CHAPMAN & HALL, LIMITED.

1904.

ROBERT DRUMMOND, PRINTER, NEW YORK.

PREFACE.

THIS collection of tables, formulæ, and methods of calculation has been made for the benefit of the sugar chemist of Louisiana and other countries manufacturing cane-sugar. The information found in the standard work on sugar chemistry has purposely been omitted so that this book may be considered in the nature of a supplement, the outline of a system of chemical control which will, if followed out conscientiously, make a laboratory a valuable addition to any sugar-house.

The manager depends on the chemist for information used in conducting the work of the factory, and the efficiency of a laboratory is judged by the accuracy and dispatch used in furnishing this information. The manager wishes to know the mill extraction, the per cent of sucrose in the raw juice, the yield of sugar, the losses in manufacture, and most of all, whether or not all of the available sugar is being extracted from the cane.

The value of securing accurate figures of all of these details every day or week is evident to every

practical sugar man. In themselves the figures are not valuable, but the comparison which naturally follows this examination leads to changes and improvement in the manufacture, and thereby increases the yield of sugar.

A good chemist should be thoroughly familiar with the practical side of the manufacture in order to more readily see the information most needed. In some factories there is a poor filter-press arrangement, and the loss of sucrose by running the skimmings into the ditch is immense. A careful checking of the sucrose account shows by the difference between the sucrose in the juice and sucrose in the total product the amount of sucrose lost, and the importance of watching this part of the factory is clearly shown. In other factories there is a large loss of sugar in the final molasses and the pan work requires especial attention. The main object of carrying on the business is the recovery of the greatest amount of sugar at the least cost, and the chemist should always keep this before him during the season if he desires to become valuable to his employer.

The tables of "factors," the "yield of sugars from a ton of cane," and the formula for "available sugar," are all based on a formula published by Prof. Crowley of the Hawaiian Experimental Station, in the "Louisiana Planter." The blank forms were compiled by C. S. McFarland, the manager of the Houmas Central Factory. The possi-

bility of "checking up" the sucrose account, thus locating errors in the measurement and analysis, and the losses in manufacture, is the chief benefit of this system of chemical control, and although the number of calculations necessary at first seems great, after the analyses are averaged and the weekly report finished, there is a satisfaction in knowing just what the factory has accomplished.

IRVING H. MORSE.

EMPORIA, KANSAS.

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CALCULATIONS

USED IN

CANE-SUGAR FACTORIES.

CHAPTER I.

ANALYSIS OF PRODUCTS.

It is important that all the products should be analyzed by the same method for the entire season. Either all of the samples should be weighed out and made up to 100 c.c. or all should be made by the volumetric method. By analyzing a part of the samples by the volumetric method and part by weighing, the error due to the lead precipitate and temperature affect the polariscope reading in opposite directions and at the end of the week the sucrose account does not "check up." Especial care should be taken in determining the accuracy of the Brix spindle, and if possible the same spindles should be used for all samples.

The analysis necessary to keep track of all the operations of the factory are as follows:

Raw juice—4 to 6 times a day—continuous sample.

Syrup—every twelve hours—continuous sample.

1st massecuite, 1st sugar, 1st molasses—every strike.

2d massecuite, 2d sugar, 2d molasses—once a day.

2d massecuite boiled—every strike.

3d massecuite boiled—every strike.

Bagasse—once a day.

Filter-press cake—once a day.

Method of Analysis.

Raw, Sulphured, Clarified, and Filtered Juices.—*Per Cent Solids.*—Use Brix hydrometer 1/20 division.

Sucrose.—Weigh out double-normal weight, add lead and water in a 100-c.c. flask, filter, and polarize. Divide reading by two; or measure out 100 c.c., make up to 110 with lead and polarize; the reading is found in Table I, page 4.

Glucose.—Weigh out 5 or 10 grams, dilute with water to 100 c.c., and test by means of Fehling's solution. For per cent glucose consult Table IV.

Syrup.—*Per Cent Solids.*—Reduce the density of the syrup by the addition of water to approximately the density of the juice by weighing out 166⅔ grams or 125 grams of the syrup and adding enough water to make the solution weigh 500 grams. It is analyzed in the same manner as the raw juice and the

percentages multiplied by three or four to find the solids, sucrose, and glucose of the original solution.

MASSECUITE AND MOLASSES.—Dissolve 50 grams of massecuite or molasses in 450 grams of water. Analyze in the same way as raw juice and multiply the results by 10.

FILTER-PRESS CAKE (Spencer).—Weigh out 12½ grams of cake, add hot water, and beat to a paste, transfer to a 100-c.c. flask, add a few drops of lead, and place on a steam-bath for thirty minutes. Cool, make up to 100 c.c., filter, and polarize. Multiply the reading by 2.

BAGASSE—SUCROSE.—50 grams of finely divided bagasse treated with a few drops of lead and about 450 grams of water is placed on a steam-bath for thirty minutes. It is then weighed the second time and sufficient water added to make the total weight 500 grams. The sugar solution is separated from the fibre by pressure and the sucrose determined by the volumetric method. Multiply the reading by 10.

WOODY FIBRE (Spencer).—Weigh out 20 grams of finely divided bagasse into a beaker, cover the top of the beaker with thin muslin, add cold water, allow to stand for twenty minutes, then decant the water and add cold water twice and hot water five times. The fibre is then dried at 100° C. and weighed.

The woody fibre in the cane may be determined approximately by the following proportion: 20 grams : wgt. of fibre :: total wgt. of bagasse : woody fibre in bagasse.

For example, suppose the per cent mill extraction to be 75 per cent, then 25 per cent would represent the per cent of bagasse (the woody fibre in the sample weighed 8 grams). Then

$20 : 8 :: 25 : x = 10 =$ the woody fibre in the cane.

TABLE I.

SUCROSE IN MILL JUICE.

(Schmitz.)

$$\text{Per cent sucrose} = \text{reading} \left(\frac{26.048}{\text{sp. gr.}}\right) 110.$$

TO BE USED IN LOUISIANA.

Polariscope Reading.	Per Cent Sucrose.	Polariscope Reading.	Per Cent Sucrose.
25	6.84	46	12.35
26	7.12	47	12.61
27	7 39	48	12.87
28	7.66	49	13.14
29	7.92	50	13.40
30	8.18	51	13 66
31	8.45	52	13.92
32	8 71	53	14.17
33	8.98		
34	9.24	Tenth of Degrees	Per Cent Sucrose.
35	9.51		
36	9.77		
37	10.03	0.1	.03
38	10.29	0 2	.05
39	10.55	0.3	.08
40	10.81	0.4	.11
41	11.07	0 5	.13
42	11.33	0.6	.16
43	11.59	0.7	.19
44	11.84	0.8	.21
45	12.10	0.9	.24

TABLE I.—(*Continued.*)

SUCROSE IN MILL JUICE.

(Schmitz.)

$$\text{Per cent sucrose} = \text{reading} \left(\frac{26.048}{\text{sp. gr.}}\right) 110.$$

TO BE USED IN CUBA.

Polariscope Reading.	Per Cent Sucrose.	Polariscope Reading.	Per Cent Sucrose.
54	14.42	74	19 45
55	14.67	75	19 70
56	14 92	76	19 94
57	15.18	77	20 18
58	15 44	78	20.42
59	15 70	79	20.66
60	15 95	80	20 90
61	16.21		
62	16.46	Tenth of Degrees	Per Cent Sucrose.
63	16.72		
64	16 96		
65	17.21	0.1	.03
66	17.47	0.2	.05
67	17.72	0 3	.08
68	17 97	0.4	10
69	18 21	0 5	.13
70	18 46	0 6	16
71	18 70	0 7	.18
72	18.95	0 8	21
73	19.20	0 9	23

TABLE II.

SUCROSE IN SECOND AND THIRD MASSECUITE, FIRST, SECOND, AND COMMERCIAL MOLASSES.

(Corrected for Lead Precipitate.)

1/10 *Solution—Volumetric Method.*

Polariscope Reading.	Second Massecuite.	Third Massecuite.	First Molasses.	Second Molasses.	Commercial Molasses.
1.0	.273	.271	.277	.276	.274
2.0	.546	.542	.553	.551	.549
3.0	.819	.813	.830	.827	.823
4.0	1.092	1.084	1.107	1.102	1.098
5.0	1.364	1.353	1.384	1.379	1.372
6.0	1.644	1.630	1.660	1.653	1.646
7.0	1.910	1.894	1.937	1.929	1.921
8.0	2.193	2.165	2.214	2.204	2.195
9.0	2.456	2.435	2.491	2.480	2.470
10	2.729	2.706	2.767	2.756	2.744
11	3.002	2.977	3.044	3.031	3.018
12	3.275	3.247	3.321	3.307	3.293
13	3.548	3.518	3.598	3.582	3.567
14	3.821	3.789	3.874	3.858	3.842
15	4.094	4.059	4.151	4.133	4.116
16	4.366	4.330	4.428	4.409	4.390
17	4.639	4.600	4.704	4.685	4.665
18	4.912	4.871	4.981	4.960	4.939
19	5.185	5.141	5.258	5.236	5.213
20	5.458	5.412	5.535	5.511	5.488

NOTE.—Remove decimal point one place to the left to obtain per cent sucrose corresponding to tenth of degree polariscope reading.

TABLE III.

SUCROSE IN FIRST MASSECUITE AND SECOND SUGAR.

(Corrected for Lead Precipitate.)

1/10 *Solution—Volumetric Method.*

FIRST MASSECUITE.		SECOND SUGAR.	
Polariscope Reading.	Per Cent Sucrose.	Polariscope Reading.	Per Cent Sucrose.
0.1	.028	0.1	.028
0.2	.055	0.2	.055
0.3	.083	0.3	.083
0.4	.110	0.4	.110
0.5	.138	0.5	.138
0.6	.165	0.6	.166
0.7	.193	0.7	.193
0.8	.220	0.8	.221
0.9	.248	0.9	.249
20	5.512	28	7.691
21	5.788	29	7.966
22	6.063	30	8.241
23	6.339	31	8.515
24	6.614	32	8.767
25	6.890	33	9.118
26	7.166	34	9.394
27	7.441		
28	7.718		
29	7.992		
30	8.268		

TABLE IV.

GLUCOSE.

WEIGH OUT 5 GRAMS OF SUGAR SOLUTION AND MAKE UP TO 100 C.C.

No. c.c. Solution.	Per Cent Glucose.	No. c.c. Solution.	Per Cent Glucose.
20	5.00	30	3.33
20.5	4.88	30.5	3.28
21	4.76	31	3.22
21.5	4.65	31.5	3.17
22	4.54	32	3.12
22.5	4.44	32.5	3.08
23	4.35	33	3.03
23.5	4.25	33.5	2.98
24	4.17	34	2.94
24.5	4.08	34.5	2.89
25	4.00	35	2.86
25.5	3.92	35.5	2.81
26	3.85	36	2.78
26.5	3.77	36.5	2.74
27	3.70	37	2.70
27.5	3.64	37.5	2.66
28	3.57	38	2.63
28.5	3.51	38.5	2.59
29	3.45	39	2.56
29.5	3.39	39.5	2.53

TABLE IV.

GLUCOSE.

WEIGH OUT 5 GRAMS OF SUGAR SOLUTION AND MAKE UP TO 100 C.C.

No. c.c. Solution.	Per Cent Glucose.	No. c.c. Solution.	Per Cent Glucose.
40	2.50	50	2.00
40.5	2.47	50.5	1.98
41	2.44	51	1.96
41.5	2.40	51.5	1.94
42	2.38	52	1.93
42.5	2.35	52.5	1.90
43	2.32	53	1.88
43.5	2.30	53.5	1.87
44	2.27	54	1.85
44.5	2.24	54.5	1.83
45	2.22	55	1.81
45.5	2.20	55.5	1.80
46	2.17	56	1.78
46.5	2.15	56.5	1.77
47	2.13	57	1.75
47.5	2.10	57.5	1.74
48	2.08	58	1.72
48.5	2.06	58.5	1.71
49	2.04	59	1.70
49.5	2.02	59.5	1.68

CHAPTER II.

EXTRACTION.

THE term "extraction" when used in connection with the manufacture of sugar has acquired three distinct meanings, depending on the locality. In Louisiana it means the "per cent of juice by weight extracted from the cane." In Cuba the yield of sugar is called "the extraction," and in the Hawaiian Islands the name is applied to the sucrose in the juice compared with the sucrose in the cane. The different kinds of extraction may be distinguished by the terms "mill," "sugar," and "sucrose extraction."

I. MILL EXTRACTION.—The most accurate method of determining the amount of juice extracted from the cane is by direct weighing, but this is not usually done on account of the extra cost of the weighing apparatus, tanks, etc. The juice is conveniently measured in large tanks with an overflow, a method undoubtedly the most accurate of any used for measuring the juice, and one which has been adopted by most of the large factories. In measuring the juice by means of tanks without an overflow or in clarifiers, there is a chance for irregularity, and it is only by careful watching, that the correct percentage

of mill extraction can be determined. Although in filling two tanks with juice there may be a considerable difference in the amount, yet in filling one hundred tanks the average will be the same as another one hundred filled under similar conditions. It is this fact which makes it possible to obtain satisfactory figures in factories measuring the juice in this manner.

The use of clarifiers for measuring the juice introduces other irregularities. The temperature is increased and a correction is necessary to reduce the hot to cold juice. Often "tank" bottoms are pumped into the clarifiers and the juice drained from the troughs is mixed with the green juice, for which an allowance must be made in the total capacity of the clarifier.

These corrections are, however, constant, and although the actual number of gallons of juice for each clarifier may be higher or lower than the actual contents, yet the percentage of extraction will increase or decrease in the same proportions as it would if the exact number of gallons had been recorded. The mill work is thus indicated in direct proportions to the true per cent of extraction.

II. SUGAR EXTRACTION.—Per cent sugar extraction $= \left(\frac{\text{pounds of dry sugar}}{\text{pounds of cane}}\right) 100.$

III. SUCROSE EXTRACTION.—The Sugar-chemist Association of Hawaii have defined "sucrose" extraction as follows:

"The amount of sucrose coming to the mill in the cane is the sum of the sucrose in the properly weighed mixed juice and the sucrose in the bagasse.

"By extraction is meant the percentage of sucrose in the cane which is obtained in the mixed juice."

Saturation.

The percentage of saturation is computed in two different ways:

Either

$$\left.\begin{matrix}\text{Per cent}\\ \text{saturation}\end{matrix}\right\} = \left(\frac{\text{weight of water of saturation}}{\text{weight of cane}}\right)100$$

or

$$\left.\begin{matrix}\text{Per cent}\\ \text{saturation}\end{matrix}\right\} = \left(\frac{\text{weight of water of saturation}}{\text{weight of raw juice}}\right)100.$$

The percentage of water of saturation which is found in the diluted juice is determined approximately by the following formula:

Let x = per cent of water of saturation in diluted juice;

a = pounds of water of saturation;

b = pounds of diluted juice;

c = per cent of solids in raw juice;

d = per cent of solids in diluted juice;

then

$$x = \frac{\left(1 - \frac{d}{c}\right)b}{a}.$$

As it is impossible to take a sample of raw juice when the water of saturation is being added, the relation between the per cent solids in the juice from the first mill and the juice from all the mills when saturation has been discontinued is carefully determined. In the above formula the per cent solids in the raw juice is represented by the per cent solids in the juice from the first mill less this difference, usually about $\frac{3}{10}$ of 1° Brix.

Inversion.

(Dr. Stubbs.)

Let R_1 = ratio of juice before any treatment;
R_2 = ratio of juice after any treatment;
then

$$\text{Per cent inversion} = \frac{R_2 - R_1}{R_2 + 105.26}.$$

The pounds of sucrose in the juice before treatment multiplied by the per cent inversion gives the pounds of sucrose lost by inversion.

The addition of lime and the application of heat to the juice always destroys a certain amount of glucose, so that the total amount of inversion cannot be determined accurately. The inversion between the raw and sulphured juices may be found and also between the syrup and first massecuite. An increase in the ratio of the syrup over that of the sulphured juice indicates only a part of the inversion, for by the addition of lime in the clarifi-

cation a certain amount of the glucose has been destroyed, consequently the ratio has been lowered.

Formulæ for Pan Work.

In making "ninety-six sugar" a certain per cent of first molasses is drawn into the pan with the syrup, a practice which considerably increases the yield of first sugar. No rule can be laid down governing this part of the manufacture, for every factory is differently arranged and operated, and it is natural that some will obtain much better results than others on this account.

The control of the hot-room is, however, the key to the situation. The cars should be filled with a massecuite having the lowest purity possible that will granulate and dry in time to prevent the house from being "blocked off" for the lack of cars. Having found by experiment the purity which fulfils all these conditions, the next step is to mix the first molasses in the pan to a point that the massecuite on being dried will yield a first molasses having a purity suitable for the hot-room.

In order to do this the average "per cent of commercial sugar recovered from the sucrose in the massecuite" is found by the following formula. Under similar conditions an average analysis of five strikes will give a reliable figure.

Formula I. To find per cent of commercial sugar recovered from the sucrose in the massecuite.

Let x = per cent of commercial sugar recovered;
a = purity of massecuite;
b = purity of resulting molasses;
then

$$x = \frac{(a-b)\text{ "factor"}}{a}.$$

The "factor" corresponding to various polarizations and purity of molasses are found in Table VII.

Example.—Let $a = 80$;
$b = 50$;
polarization of sugar = 96;
then

$$x = \frac{(80-50)2.16}{80} = 81 \text{ per cent.}$$

Formula II. To find the purity of a mixture of massecuite which will yield on purging a given purity of molasses:

$$\left.\begin{matrix}\textit{Purity of}\\ \textit{mixture}\end{matrix}\right\} = \frac{\begin{matrix}\textit{factor of molasses}\\ \times \textit{purity of molasses}\end{matrix}}{\begin{matrix}\textit{factor of molasses}\\ -\textit{per cent of com. sugar recovered}\end{matrix}}.$$

Example.

Purity of molasses ..... = 46
Factor of molasses. ..... = 1.99
Per cent 96° sugar recovered... = 81
then

$$\text{Purity of mixture} = \frac{1.99 \times 46}{1.99 - .81} = 77.57.$$

Formula III (S. L. Langdon, Jr.).—To find the amount of first molasses necessary to reduce the purity of the massecuite to a required purity.

The number of gallons of first molasses taken into the pan to reduce the purity of the mixture to a required purity may be found in two different ways.

First Method. Assuming the complete strike contains 100 parts solids,

then

$$\left.\begin{array}{c}\text{Per cent solids of first}\\ \text{molasses used}\end{array}\right\} = \frac{\begin{array}{c}\text{purity of syrup}\\ -\text{purity of mixture}\end{array}}{\begin{array}{c}\text{purity of syrup}\\ -\text{purity of molasses}\end{array}}.$$

Example.

$$\text{Per cent solids of first molasses} = \frac{80-77.57}{80-50} = 8.10.$$

Multiply the per cent solids of first molasses by the total pounds solids in an average strike and divide this by the number pounds solids in one gallon found in Table IV, page 49.

Example.

Total pounds of solids in strike. . . . . = 32,000
Per cent of solids in first molasses. . . . . = 8.10
Pounds of solids in one gallon molasses.
80° B. . . . . = 9.43

then

$$\left.\begin{array}{c}\text{Number of gallons first}\\ \text{molasses 80° Brix}\end{array}\right\} = \frac{32000\times.081}{9.43} = 274.8.$$

Second Method.

Let x = gallons of first molasses for each 100 gallons of syrup;

a = pounds of solids in one gallon of syrup;

b = pounds of solids in one gallon of molasses;

c = per cent of solids of syrup to be taken into the pan;

d = per cent of solids of molasses to be taken into the pan;

then

$$x = \frac{100\,ad}{bc}.$$

Example.

Let $a = 5.136$;

$b = 9.43$;

$c = 91.90 = (100 - 8.10 = 91.90)$;

$d = 8.10$;

then

$$x = \frac{(5.136 \times 8.10)\,100}{9.43 \times 91.80} = 4.8.$$

For every 100 gallons of syrup 50° Brix and 80 purity, 4.8 gallons of first molasses 80° Brix and 50 purity are necessary to insure a purity of 77.57 in the mixture.

Formula I may be used to advantage in controlling the work of the pans and centrifugals. The object of good sugar-boiling and sugar-drying is to obtain the greatest amount of sugar in one operation. The formula gives the per cent of commercial sugar from the sucrose in the massecuite, so that the

work of both departments can be controlled. A sample of massecuite, molasses and sugar are taken about the middle of the strike, analyzed, and the percentage recovered calculated. By finding out this percentage for each strike, poor boiling or centrifugal work can be detected at once. Occasionally the centrifugal sieve is broken, allowing grains of sugar to pass through into the molasses, which causes the percentage of sugar to be greatly reduced. False grain in the pan is another cause of the low yields of sugar and is often discovered by means of this calculation.

Available Sugar.

Formula I.

Let x = pounds of commercial sugar per gallon or cubic foot;

a = pounds of sucrose per gallon or cubic foot;

b = purity of original sugar solution;

c = purity of resulting molasses;

then

$$x = a\left(\frac{(b-c)\text{ ``factor''}}{b}\right).$$

Case I.—To find the available sugar in one gallon of raw juice.

Example.—Analysis:

Brix	16.00
Sucrose	13.00
Purity	81.20

From Table VII the following data are obtained:

Weight of one gallon of juice (16° Brix). . . = 8.88
Pounds of solid matter. . . . . = 1.421
Pounds of sucrose. . . . . = 1.1544

The usual loss in manufacture is 5 per cent. Thus only 95 per cent of the sucrose would be treated.

Then

$$x = (.95)1.1544\left(\frac{(81.2-30)1.51}{81.2}\right) = 1.044 \text{ lbs. available sugar.}$$

Case II.—To find the available first and second sugar and gallons of molasses in a cubic foot of first massecuite.

Analysis:

Brix.	94.00
Sucrose.	75.2
Purity.	80.0
Weight of one cubic foot	94.6
Pounds of solids in one cubic foot	88.92
Pounds of sucrose in one cubic foot	71.14
Polarization of first sugar	96.00
Purity of first molasses (assumed).	45.00

First Sugar:

$$71.14\left(\frac{(80-45)1.95}{80}\right) = 60.68 \text{ lbs. available first sugar.}$$

Proof:

Pounds.	Solids.	Sucrose.	Purity.	
94.60	88.92	71.14	80	1st massecuite
60.68	60.26	58.25	96.7	96° sugar
33.92	28.66	12.89	44.98	1st molasses

SECOND SUGAR:

Polarization of second sugar..... 88°.00
Purity of second molasses (assumed) 30.00

Then

$$12.89\left(\frac{(44.98-30)1.705}{44.98}\right)=7.325 \text{ lbs. } 88° \text{ sugar.}$$

Proof:

Pounds.	Solids.	Sucrose.	Purity.	
33.920	28.660	12.890	44.98	1st molasses
7.325	7.156	6.446	90.1	2d sugar
25.595	21.504	6.444	30.0	2d molasses

COMMERCIAL MOLASSES=

$$\frac{21.504}{9.43}\ 2.28 \text{ gallons.}$$

Yield of first sugar.....	60.68	lbs.
" " second sugar.....	7.325	"
Total.....	68.005	lbs.
Gallons of com. molasses.	2.28	

Case III.—To find the available sugar in one cubic foot of second massecuite.

Analysis:

Brix	91.00
Sucrose	41.86
Purity	46.00
Weight of one cubic foot	93.25
Pounds of solids in one cubic foot	84.86
Pounds of sucrose in one cubic foot	39.03
Polarization of second sugar	88.00
Purity of second molasses	30.00

SECOND SUGAR:

$$39.03\left(\frac{(46-30)1.705}{46}\right)=23.164 \text{ lbs. sugar.}$$

Proof:

Pounds.	Solids.	Sucrose.	Purity.	
93.25	84.86	39.03	46.0	2d massecuite
23.164	22.63	20.38	90.1	2d sugar
	62.23	18.65	30.0	2d molasses

COMMERCIAL MOLASSES.

$$\frac{62.23}{9.43}=6.6 \text{ gallons.}$$

One cubic foot of second massecuite yields:

Second sugar	23.164 lbs.
Molasses	6.60 gals.

Formula II (International Sugar Journal).

Let x = available sugar;

a = solids in one gallon or cubic foot;

b = sucrose " " " " " "

then $$x = \frac{b - .3(a-b)}{\text{polarization}} = \text{purity of molasses} = 25.8.$$

The same formulæ, using .4 = .5, etc., instead of .3, are given below, which will yield a final molasses of higher purity:

$$x = \frac{b - .4(a-b)}{\text{polarization}} = \text{purity of molasses} = 31.4.$$

$$x = \frac{b - .5(a-b)}{\text{polarization}} = \text{purity of molasses} = 36.$$

$$x = \frac{b - .6(a-b)}{\text{polarization}} = \text{purity of molasses} = 40.$$

$$x = \frac{b - .7(a-b)}{\text{polarization}} = \text{purity of molasses} = 43.5.$$

$$x = \frac{b - .8(a-b)}{\text{polarization}} = \text{purity of molasses} = 46.5.$$

$$x = \frac{b - .9(a-b)}{\text{polarization}} = \text{purity of molasses} = 49.1.$$

$$b = \frac{b - (a-b)}{\text{polarization}} = \text{purity of molasses} = 51.4.$$

Example.

Per cent of solids	94.00
Per cent of sucrose	75.20
Purity	80.00
Solids in one cubic foot	88.92
Sucrose in one cubic foot	71.14

Then

$$\frac{71.14-.8(88.92-71.14)}{96}=59.3 \text{ lbs. } 96^\circ \text{ sugar.}$$

Crowley's Formula.

Let x = pounds of commercial sugar;
a = pounds of any sugar solution;
b = per cent of solids of any sugar solution;
c = purity of any sugar solution;
d = " " molasses after purging;
e = " " commercial sugar;
f = per cent of solids of commercial sugar;

then

$$x=\frac{ab(c-d)}{fe-d};$$

$$a=\frac{fx(e-d)}{b(c-d)};$$

$$b=\frac{fx(e-d)}{a(c-d)};$$

$$c=\frac{fx(e-d)+abd}{ab};$$

$$d=\frac{abc-exf}{ab-xf};$$

$$e=\frac{ab(c-d)+xfd}{xf};$$

$$f=\frac{ab(c-d)}{x(e-d)}.$$

Spencer's Formula for Mixture.

Let a = purity of first solution;
b = " " second solution;
c = pounds of solids in first solution;
d = " " " " second solution;
x = purity of mixture;

then

$$x = \frac{ac + bd}{c + d};$$

$$a = \frac{x(c + d) - bd}{c};$$

$$b = \frac{x(c + d) - ac}{d};$$

$$c = \frac{d(x - b)}{a - x};$$

$$d = \frac{c(a - x)}{x - b}.$$

CHAPTER III.

LABORATORY RECORDS.

It is of the greatest importance that each analysis should be recorded and from time to time an average made of the analyses of the same kind of products, in order to compare the various operations of the factory. As a rule the factories close down Sunday morning, and it is the custom to call upon the chemist for a report of the week's work. From the weight of cane and sugar and the average analyses of the different products he must construct a statement which will be understood by the men having charge of the departments, and serve as a guide for the future working of the factory. The set of blank forms given on pages 32 to 42 are suitable for a factory manufacturing first, second, and third sugar, but with a few changes they could be adapted to the needs of any factory.

Form 1.—The per cent "water of saturation" is found by the formula under the heading "Saturation" and multiplied by the pounds of water added to the bagasse. The pounds of water subtracted

from the pounds of diluted juice gives the pounds of raw juice, and this divided by the weight of the cane gives the per cent of extraction.

Form 2.—The daily analyses are averaged and recorded. The gallons of diluted juice corresponding are calculated from the number of tanks of juice. From the Brix of the juice the pounds for one gallon of juice are found from the tables and the total pounds of diluted juice determined. This is multiplied by the per cent solids, sucrose, and glucose.

Form 3.—The juices affected by clarification are arranged together for comparison. The glucose ratio and purity of each product indicate the efficiency of the treatment, and error in the manufacture can be corrected and the process improved.

Form 4.—The massecuite, molasses, and sugar for each strike are analyzed and the percentage of "sugar from the sucrose in the massecuite" determined and recorded. This form makes it possible to control the pans and centrifugal work.

Form 5.—The analyses of the second and third massecuite are recorded and the amount of solids, sucrose, and glucose calculated as in Form 2.

Form 6.—The analyses of second massecuite (dried), second molasses, and second sugar are analyzed once a day and the percentage of second

commercial sugar from the sucrose in the massecuite calculated.

Form 7.—This form makes it possible to calculate accurately the amount of "available sugar" in the factory when the mill stops grinding. Sunday morning the chemist is given a report of the total sugar dried. The average "polarization to date" for this sugar is used to find the per cent solids of the sugar in the tables (page 43) and the pounds of sugar multiplied by the per cent of solids and polarization gives the pounds of solids and sucrose of the sugar.

Any clarified juice on hand in the factory is measured, a sample analyzed, and the pounds, pounds of solids, and sucrose calculated, and also the available first and second sugar. The syrup, first and second molasses are measured and sampled and the available sugar determined in the same way. The amount of second and third massecuite on hand is found by counting the cars in the hot-room and measuring number of cubic feet of the third massecuite in the tanks and the corresponding analysis found by averaging the analysis of the strikes not dried. In case any commercial molasses has been shipped, the average analysis and amount are recorded.

It is evident that the sum of the pounds solids of each of the products and sucrose in each of the products should be the same as the pounds solids and sucrose of the original product, the syrup, for in

the process of manufacture nothing is lost; the molasses is separated from the sugar, but the total pounds solids and sucrose should remain the same. To prove whether this is so the total pounds sucrose is divided by the total pounds solids, and if the purity of the total product is the same as the purity of the syrup, it is a proof that the measurement and analysis of the "stock on hand" is correct. The greater the accuracy in sampling, analyses, and measurement, the nearer the purity of the total product will approach the purity of the syrup.

If the purity of the total product is lower than the purity of the syrup, it indicates that there is too much low-grade sugar or too little sugar. On the other hand, if the purity is higher than the purity of the syrup, the opposite is true—a part of the low-grade sugars have been omitted. When the purity of the total product and syrup are the same the difference between the sucrose in the raw juice and total product represents the "loss in manufacture."

The calculation of the available sugar in the product on hand is based on previous results. In houses making 96° sugar, the high-grade first molasses is taken back into the pan with the syrup in sufficient quantities to insure a first molasses from a "mixed" strike suitable for the hot-room, so in calculating the available first sugar in the syrup the purity desired for the hot-room is used in the calculations. In making "YC" sugar first molasses is seldom taken back into the pan, so the average "per cent of com-

mercial sugar from the sucrose in the massecuite" for the preceding week can be used.

These calculations may be better understood by the example in "Form 7," pages 38 and 39.

Analysis of syrup:

Brix	50
Sucrose	40.5
Purity	81.0

Number of gallons	7,640
Pounds	78,478
Solids	39,239
Sucrose	31,783
Purity of first molasses (assumed)	45.00

Pounds of available 96° sugar

$$= \left(\frac{(81-45)1.95}{81}\right)31.783 = 27546.$$

Proof:

Pounds.	Solids.	Sucrose.	Purity.	
78,478	39,239	31,783	81	syrup
27,546	27,376	26,466	96.7	sugar
	11,863	5,317	44.83	first molasses

Pounds of available second sugar, 88°,

$$= \left(\frac{(44.83-25)1.575}{44.83}\right)5317 = 3722.$$

Proof:

Pounds.	Solids.	Sucrose.	Purity.	
	11,863	5317	44.83	first molasses
3,722	3,636	3275	90.1	second sugar
	8,227	2042	24.82	second molasses

To calculate the yield of "YC" sugar and second sugar from the same syrup, the average per cent sugar from sucrose in massecuite being 68 per cent. Then

$$31,783 \times 68 = 21,752 \text{ lbs. } 99^\circ \text{ sugar.}$$

Proof:

Pounds.	Solids.	Sucrose.	Purity.	
78,478	39,239	31,783	81	syrup
21,752	21,675	21,479	99.1	"YC" sugar
	17,564	10,304	58.66	first molasses

Available second sugar, 88°,

$$= \left(\frac{(58.66 - 25)1.575}{58.66} \right) 10.304 = 9311.$$

Proof:

Pounds.	Solids.	Sucrose.	Purity.	
	17,564	10,304	58.66	first molasses
9,311	9,097	8,194	90.1	second sugar
	8,467	2,110	24.8	second molasses

Form 8.—This is the weekly report and contains the average analysis of all the products for the week and to date. The mill extraction yield of sugar from cane and juice, the sucrose account, and the loss in manufacture when compared from week to week are valuable aids to the management in improving the effectiveness of the factory.

Form 9.—Here the analyses of the filter-press cake and the bagasse are recorded.

Form 1. ..... *Factory. Season of* 190

MILL RECORD.

Date.	Tons of Cane.	Mill Time.			No. of Tanks of Juice Extracted.				
		No. of Watches.	Hours.	Minutes.	First Watch.	Second Watch.	Third Watch.	Fourth Watch.	Total.
Week.									
Bgt. forward.									
Total to date.									

Form 2. ..... *Factory. Season of* 190

RECORD OF RAW JUICE

Date.	Analysis of Raw Juice.					
	Brix.	Sucrose.	Glucose.	Non-sugars.	Ratio.	Purity.
Week.						
Bgt. forward.						
Total to date.						

..... *Factory.* *Season of* 190

MILL RECORD.

No. of Gallons Juice and Water.	No. of Pounds Juice and Water.	Saturation.			Pounds of Raw Juice.	Mill Extraction.
		Pounds of Water. Total	Per Cent in Juice.	Pounds of Water in Juice.		

..... *Factory.* *Season of* 190

RECORD OF RAW JUICE.

Gallons of Diluted Juice.	Pounds of Diluted Juice.	Pounds Solids.	Pounds Sucrose.	Pounds Glucose.

Form 3. ..... *Factory.* *Season of* 190

CLARIFICATION.

Date.	Sulphured Juice.							Filtered Juice.					
	Brix.	Sucrose.	Glucose.	Non-sugar.	Ratio.	Purity.		Brix.	Sucrose.	Glucose.	Non-sugar.	Ratio.	Purity.
Week.....													
Brought forward...													
Total to date.....													

Form 4. ..... *Factory.* *Season of* 190

PAN RECORD—FIRST SUGARS.

Date.	No. Strike.	Pan.		Analysis of First Massecuite.				First Sugar.		
				Brix.	Sucrose.	Purity.		Pounds.	Pol'n.	Sucrose.
Week.....										
Brought forward...										
To date.....										
Dried.....										
On hand.....										

..... *Factory.* *Season of* 190

CLARIFICATION.

Clarified Juice.							Syrup.					
Brix.	Sucrose.	Glucose.	Non-sugar.	Ratio.	Purity.		Brix.	Sucrose.	Glucose.	Non-sugar.	Ratio.	Purity.

..... *Factory.* *Season of* 190

PAN RECORD.—FIRST SUGAR.

First Molasses.						
Brix.	Sucrose.	Purity.		Per Cent C.S. Recovered.	Time of Boiling.	Remarks.

Form 5. ..... *Factory.* *Season of* 190

PAN RECORD—SECOND SUGARS.

Date.	Analysis of Second Massecuite.						Strike No.	No. Cars.
	Brix.	Sucrose.	Glucose.	Non-sugars.	Ratio.	Purity		
Week. ..... Bgt. forward.								
To date								

Form 6. ..... *Factory.* *Season of* 190

HOT-ROOM RECORD.

Date.	Second Massecuite.				No. Cubic Feet Massecuite Dried.	Pounds of Second Sugar.	Polarization of 2d Sugar
	Brix.	Sucrose.	Purity.				
Week. ..... Bgt. forward.							
To date							
Dried.							
On hand.							

..... *Factory.* *Season of* 190

PAN RECORD—SECOND SUGARS.

Cubic Feet.	Pounds.	Solids.	Sucrose.	Glucose.

..... *Factory.* *Season of* 190

HOT-ROOM RECORD.

Pounds Sucrose.	Pounds of Sugar per Cubic Foot.	Second Molasses.				Per Cent Second Sugar Recovered.	
		Brix.	Sucrose	Purity.			

Form 7. ..... *Factory.* *Season of* 190

STOCK ON HAND—WEEKLY ESTIMATE.

Products.	Analyses of Products.			Gallons or Cubic Feet.	Total Pounds.
	Brix.	Sucrose.	Purity.		
Total first sugar. . .	99.4	96.5	97.1	.....	2,649,350
Total second sugar.	97.6	87.5	89.65	.....	205,925
Clarified juice.....	15.20	12.16	80.00	15000	132,720
Syrup.....	50.00	40.50	81.00	7640	78,478
First molasses.....	83.00	38.18	46.00	2450	28,326
Second massecuite.	91.00	41.40	45.50	5200	484,900
Second molasses. ..	85.00	25.50	30.00	3000	36,240
Third massecuite. .	92.00	31.28	34.00	8050	754,446
Com. molasses. . . .					
Total to date	.....	.....	79.38		
Previously reported	.....	.....	79.10		
For week.....	.....	.....	80.50		

PURITIES OF TOTAL PRODUCTS.

100(3.241,504 ÷ 4.083,513) = 79.38
100(2.584,643 ÷ 3.266,807) = 79.10
100(657,464 ÷ 816,706) = 80.50

..... *Factory. Season of* 190

STOCK ON HAND—WEEKLY ESTIMATE.

Pounds Solids.	Pounds Sucrose.	Available Sugar.		
		First Sugar.	Second Sugar.	Total Sugar.
2,633,454	2,556,622	2,649,350	.....	2,649,350
200,983	180,184	.....	205,925	205,925
20,173	16,139	13,771	1,843	15,614
39,239	31,783	27,546	3,722	31,268
23,510	10,805	.....	7,742	7,742
441,260	200,749	.....	142,449	142,449
30,804	9,241	.....	2,826	2,826
694,090	235,981	.....	98,380	98.380
4,083,513	3,241,504	2,690,667	462,887	3,153,554
3,266,807	2,584,643	2,126,260	379,152	2,505,412
816,706	657,464	564,407	83,735	648,142

Weekly Report.

Form 8. ..... *Factory.* 6 A.M. *Sunday,* 190

AVERAGE ANALYSIS—FOR WEEK.

	Raw Juice.	Sulphured Juice.	Clarified Juice.	Filtered Juice.	Syrup.	First Massecuite.	First Molasses.	Second Massecuite.	Second Molasses.	Third Massecuite.	First Sugar.	Second Sugar.	Filter-press Cake.
Specific grav...													
Beaumé.													
Brix.....													
Sucrose.....													
Glucose.....													
Non-sugars...													
Ratio.....													
Purity.....													

AVERAGE ANALYSIS—TO DATE.

	Raw Juice.	Sulphured Juice.	Clarified Juice.	Filtered Juice.	Syrup.	First Massecuite.	First Molasses.	Second Massecuite.	Second Molasses.	Third Massecuite.	First Sugar.	Second Sugar.	Filter-press Cake.
Specific grav...													
Beaumé.													
Brix.....													
Sucrose.....													
Glucose.....													
Non-sugars...													
Ratio.....													
Purity.....													

WEEKLY REPORT.

	For Week.	To Date.
MILL-WORK:		
No. days grinding (by watches).		
" hours "		
" tons of cane ground.....		
" " " " " per day.		
Percentage mill extraction.....		
" saturation.....		
YIELD FROM CANE—PER TON:		
Pounds first sugar.....		
" second sugar.....		
" total sugar		
YIELD FROM SUCROSE IN RAW JUICE:		
Percentage first sugar.....		
" second sugar.....		
" total sugar.....		
SUCROSE ACCOUNT (PERCENTAGE):		
In mill juice.....		
In dry sugar.....		
In hot room.....		
In syrup and molasses on hand		
Accounted for.....		
SUCROSE LOST IN M'F'G (PERCENTAGE):		
In presses.....		
By inversion.....		
Mechanically.....		
Total loss.....		
POUNDS SUCROSE LOST IN BAGASSE PER TON.....		

Form 9. ..... *Factory.* *Season of* 190

ANALYSIS OF FILTER-PRESS CAKE, BAGASSE.

Date.	Sucrose in Filter-press Cake.	Bagasse.		Barrels of Coal Used.	Barrels of Oil Used.	Cords of Wood.
		Woody Fibre.	Sucrose.			
For week.. Bgt. for'd.						
To date ..						

CHAPTER IV.

LABORATORY TABLES.

TABLE V.

COMMERCIAL SUGAR.

PER CENT SOLIDS AND PURITY CORRESPONDING TO THE POLARIZATION FROM 80° TO 100°.

Solids.	Sucrose.	Purity.	Solids.	Sucrose.	Purity.
100	100	100	98.0	89.5	91.30
100	99.5	99.5	97.9	89.0	90.9
99.9	99.0	99.1	97.8	88.5	90.5
99.8	98.5	98.7	97.7	88.0	90.1
99.7	98.0	98.3	97.6	87.5	89.65
99.6	97.5	97.9	97.5	87.0	89.05
99.5	97.0	97.5	97.4	86.5	88.80
99.4	96.5	97.1	97.3	86.0	88.40
99.3	96.0	96.7	97.2	85.5	87.95
99.2	95.5	96.3	97.1	85.0	87.55
99.1	95.0	95.85	97.0	84.5	87.11
99.0	94.5	95.45	96.9	84.0	86.7
98.9	94.0	95.05	96.8	83.5	86.2
98.8	93.5	94.65	96.7	83.0	85.8
98.7	93.0	94.20	96.6	82.5	85.4
98.6	92.5	93.81	96.5	82.0	84.95
98.5	92.0	93.40	96.4	81.5	84.55
98.4	91.5	93.00	96.3	81.0	84.10
98.3	91.0	92.65	96.2	80.5	83.65
98.2	90.5	92.15	96.1	80.0	83.22
98.1	90.0	91.75			

TABLE VI.

MILL JUICE.

TOTAL POUNDS AND POUNDS SOLIDS IN ONE GALLON.

Per Cent Solids.	Total Pounds per Gallon.	Pounds Solids per Gallon.	Per Cent Solids.	Total Pounds per Gallon.	Pounds Solids per Gallon.
12.0	8.734	1.048	15.5	8.859	1.373
12.1	8.738	1.057	15.6	8.863	1.383
12.2	8.741	1.066	15.7	8.866	1.392
12.3	8.745	1.076	15.8	8.870	1.402
12.4	8.748	1.085	15.9	8.873	1.411
12.5	8.752	1 094			
12.6	8.755	1.103	16.0	8.880	1.421
12.7	8.759	1.112	16.1	8.884	1.430
12.8	8.762	1.122	16.2	8.887	1.440
12.9	8.766	1.131	16.3	8.890	1.449
			16.4	8.895	1.459
13.0	8.769	1.140	16.5	8.898	1.468
13.1	8.773	1.149	16.6	8.902	1.478
13.2	8.777	1.158	16.7	8.906	1.487
13.3	8.780	1.168	16.8	8.910	1.497
13.4	8.784	1.177	16.9	8.913	1.506
13.5	8.787	1.186			
13.6	8.791	1.195	17.0	8.917	1.516
13.7	8.794	1.205	17.1	8.921	1.526
13.8	8.798	1.214	17.2	8.924	1.535
13.9	8.801	1.224	17.3	8.928	1.545
			17.4	8.932	1.554
14.0	8.805	1.233	17.5	8.935	1.564
14.1	8.809	1.242	17.6	8.939	1.574
14.2	8.812	1.251	17.7	8.942	1.583
14.3	8.816	1.261	17.8	8.947	1.593
14.4	8.819	1.270	17.9	8.950	1.602
14.5	8.823	1.279			
14.6	8.826	1.289	18.0	8.954	1.612
14.7	8.830	1.298	18.1	8.958	1.621
14.8	8.834	1.307	18.2	8.961	1.631
14.9	8.837	1.316	18.3	8.965	1.641
			18.4	8.968	1.650
15.0	8.841	1.326	18.5	8.972	1.660
15.1	8.844	1.336	18.6	8.976	1.669
15.2	8.848	1.345	18.7	8.979	1.679
15.3	8.852	1.354	18.8	8.983	1.689
15.4	8.855	1.364	18.9	8.986	1.698

MILL JUICE.

TOTAL POUNDS AND POUNDS SOLIDS IN ONE GALLON.

Per Cent Solids.	Total Pounds per Gallon.	Pounds Solids per Gallon.	Per Cent Solids.	Total Pounds per Gallon.	Pounds Solids per Gallon.
19.0	8.990	1.708	21.5	9.084	1.953
19.1	8.994	1.718	21.6	9.088	1.963
19.2	8.998	1.728	21.7	9.092	1.973
19.3	9.001	1.737	21.8	9.095	1.982
19.4	9.005	1.747	21.9	9.099	1.992
19.5	9.009	1.757			
19.6	9.012	1.767	22.0	9.103	2.002
19.7	9.016	1.776	22.1	9.107	2.012
19.8	9.020	1.786	22.2	9.111	2.022
19.9	9.024	1.796	22.3	9.114	2.032
			22.4	9.118	2.042
20.0	9.028	1.806	22.5	9.121	2.053
20.1	9.032	1.816	22.6	9.125	2.063
20.2	9.035	1.826	22.7	9.129	2.073
20.3	9.039	1.836	22.8	9.133	2.083
20.4	9.043	1.845	22.9	9.136	2.093
20.5	9.046	1.855			
20.6	9.050	1.865	23.0	9.140	2.102
20.7	9.054	1.875	23.1	9.144	2.112
20.8	9.058	1.884	23.2	9.148	2.122
20.9	9.061	1.894	23.3	9.152	2.132
			23.4	9.156	2.142
21.0	9.065	1.904	23.5	9.159	2.152
21.1	9.069	1.914	23.6	9.163	2.162
21.2	9.073	1.924	23.7	9.167	2.172
21.3	9.076	1.934	23.8	9.171	2.182
21.4	9.080	1.943	23.9	9.175	2.192

SYRUP.

TOTAL POUNDS AND POUNDS SOLIDS IN ONE GALLON.

Per Cent Solids.	Total Pounds per Gallon.	Pounds Solids per Gallon.	Per Cent Solids.	Total Pounds per Gallon.	Pounds Solids per Gallon.
41.0	9.872	4.047	41.5	9.893	4.105
41.1	9.876	4.059	41.6	9.998	4.117
41.2	9.881	4.070	41.7	9.902	4.129
41.3	9.885	4.082	41.8	9.906	4.141
41.4	9.889	4.094	41.9	9.911	4.152

SYRUP.

TOTAL POUNDS AND POUNDS SOLIDS IN ONE GALLON.

Per Cent Solids.	Total Pounds per Gallon.	Pounds Solids per Gallon.	Per Cent Solids.	Total Pounds per Gallon.	Pounds Solids per Gallon.
42.0	9.915	4.164	46.0	10.092	4.642
42.1	9.919	4.176	46.1	10.096	4.654
42.2	9.924	4.188	46.2	10.101	4.666
42.3	9.928	4.199	46.3	10.105	4.678
42.4	9.933	4.211	46.4	10.110	4.690
42.5	9.937	4.223	46.5	10.114	4.702
42.6	9.941	4.235	46.6	10.119	4.714
42.7	9.941	4.247	46.7	10.123	4.726
42.8	9.946	4.258	46.8	10.128	4.738
42.9	9.954	4.270	46.9	10.132	4.750
43.0	9.959	4.282	47.0	10.137	4.764
43.1	9.963	4.294	47.1	10.141	4.776
43.2	9.968	4.306	47.2	10.146	4.788
43.3	9.972	4.318	47.3	10.150	4.800
43.4	9.977	4.330	47.4	10.155	4.813
43.5	9.981	4.341	47.5	10.159	4.825
43.6	9.985	4.353	47.6	10.164	4.837
43.7	9.990	4.365	47.7	10.168	4.850
43.8	9.994	4.377	47.8	10.173	4.862
43.9	9.998	4.389	47.9	10.177	4.874
44.0	10.003	4.401	48.0	10.182	4.887
44.1	10.007	4.413	48.1	10.186	4.899
44.2	10.012	4.425	48.2	10.191	4.912
44.3	10.016	4.437	48.3	10.195	4.924
44.4	10.021	4.449	48.4	10.200	4.937
44.5	10.025	4.461	48.5	10.204	4.950
44.6	10.029	4.473	48.6	10.209	4.961
44.7	10.033	4.485	48.7	10.213	4.974
44.8	10.043	4.497	48.8	10.218	4.986
44.9	10.047	4.509	48.9	10.222	5.000
45.0	10.047	4.521	49.0	10.227	5.011
45.1	10.052	4.533	49.1	10.231	5.024
45.2	10.056	4.545	49.2	10.236	5.036
45.3	10.061	4.557	49.3	10.240	5.049
45.4	10.065	4.569	49.4	10.245	5.061
45.5	10.069	4.581	49.5	10.249	5.074
45.6	10.074	4.593	49.6	10.254	5.086
45.7	10.078	4.605	49.7	10.258	5.099
45.8	10.083	4.617	49.8	10.263	5.111
45.9	10.087	4.629	49.9	10.267	5.124

SYRUP.

TOTAL POUNDS AND POUNDS SOLIDS IN ONE GALLON.

Per Cent Solids.	Total Pounds per Gallon.	Pounds Solids per Gallon.	Per Cent Solids.	Total Pounds per Gallon.	Pounds Solids per Gallon.
50.0	10.272	5.136	54.0	10.459	5.648
50.1	10.277	5.149	54.1	10.464	5.661
50.2	10.282	5.161	54.2	10.468	5.674
50.3	10.287	5.174	54.3	10.473	5.687
50.4	10.291	5.186	54.4	10.478	5.700
50.5	10.296	5.199	54.5	10.482	5.713
50.6	10.300	5.211	54.6	10.487	5.726
50.7	10.305	5.224	54.7	10.492	5.739
50.8	10.310	5.237	54.8	10.497	5.752
50.9	10.315	5.249	54.9	10.501	5.765
51.0	10.319	5.263	55.0	10.507	5.779
51.1	10.323	5.275	55.1	10.512	5.792
51.2	10.328	5.288	55.2	10.517	5.806
51.3	10.333	5.301	55.3	10.521	5.819
51.4	10.337	5.314	55.4	10.526	5.832
51.5	10.342	5.326	55.5	10.531	5.845
51.6	10.347	5.339	55.6	10.537	5.859
51.7	10.351	5.352	55.7	10.541	5.872
51.8	10.356	5.365	55.8	10.545	5.885
51.9	10.360	5.377	55.9	10.550	5.899
52.0	10.365	5.390	56.0	10.555	5.912
52.1	10.375	5.403	56.1	10.560	5.925
52.2	10.380	5.416	56.2	10.565	5.938
52.3	10.384	5.429	56.3	10.570	5.951
52.4	10.389	5.442	56.4	10.574	5.964
52.5	10.394	5.455	56.5	10.579	5.977
52.6	10.399	5.468	56.6	10.584	5.990
52.7	10.404	5.481	56.7	10.589	6.003
52.8	10.408	5.494	56.8	10.594	6.010
52.9	10.411	5.507	56.9	10.598	6.020
53.0	10.414	5.519	57.0	10.603	6.043
53.1	10.418	5.532	57.1	10.608	6.056
53.2	10.422	5.545	57.2	10.613	6.070
53.3	10.427	5.558	57.3	10.618	6.083
53.4	10.431	5.571	57.4	10.622	6.097
53.5	10.436	5.584	57.5	10.627	6.110
53.6	10.441	5.597	57.6	10.632	6.123
53.7	10.445	5.610	57.7	10.637	6.137
53.8	10.450	5.623	57.8	10.642	6.150
53.9	10.454	5.636	57.9	10.646	6.164

SYRUP.

TOTAL POUNDS AND POUNDS SOLIDS IN ONE GALLON.

Per Cent Solids.	Total Pounds per Gallon.	Pounds Solids per Gallon.	Per Cent Solids.	Total Pounds per Gallon.	Pounds Solids per Gallon.
58.0	10.651	6.177	59.5	10.725	6.381
58.1	10.656	6.190	59.6	10.730	6.395
58.2	10.661	6.203	59.7	10.735	6.408
58.3	10.666	6.216	59.8	10.740	6.422
58.4	10.671	6.230	59.9	10.745	6.435
58.5	10.676	6.244			
58.6	10.680	6.257	60.0	10.749	6.449
58.7	10.685	6.271	60.1	10.754	6.463
58.8	10.690	6.285	60.2	10.759	6.477
58.9	10.695	6.298	60.3	10.764	6.591
			60.4	10.769	6.505
59.0	10.700	6.313	60.5	10.774	6.519
59.1	10.705	6.327	60.6	10.778	6.533
59.2	10.710	6.340	60.7	10.783	6.547
59.3	10.715	6.354	60.8	10.788	6.561
59.4	10.720	6.367	60.9	10.793	6.576

MOLASSES.

TOTAL POUNDS AND POUNDS SOLIDS IN ONE GALLON.

Per Cent Solids.	Total Pounds per Gallon.	Pounds Solids per Gallon.	Per Cent Solids.	Total Pounds per Gallon.	Pounds Solids per Gallon.
71.0	11.31	8.03	72.5	11.39	8.26
71.1	11.31	8.04	72.6	11.39	8.27
71.2	11.32	8.06	72.7	11.40	8.29
71.3	11.33	8.07	72.8	11.40	8.30
71.4	11.33	8.09	72.9	11.41	8.32
71.5	11.34	8.10			
71.6	11.34	8.12	73.0	11.42	8.33
71.7	11.35	8.13	73.1	11.42	8.35
71.8	11.35	8.15	73.2	11.43	8.36
71.9	11.36	8.16	73.3	11.43	8.38
			73.4	11.44	8.39
72.0	11.36	8.18	73.5	11.44	8.41
72.1	11.37	8.20	73.6	11.45	8.42
72.2	11.37	8.21	73.7	11.45	8.44
72.3	11.38	8.23	73.8	11.46	8.45
72.4	11.38	8.24	73.9	11.47	8.47

MOLASSES.

TOTAL POUNDS AND POUNDS SOLIDS IN ONE GALLON

Per Cent Solids.	Total Pounds per Gallon.	Pounds Solids per Gallon.	Per Cent Solids.	Total Pounds per Gallon.	Pounds Solids per Gallon.
74.0	11.47	8.49	78.0	11.69	9.10
74.1	11.48	8.50	78.1	11.70	9.12
74.2	11.48	8.52	78.2	11.70	9.14
74.3	11.49	8.53	78.3	11.71	9.16
74.4	11.49	8.55	78.4	11.71	9.17
74.5	11.50	8.57	78.5	11.72	9.19
74.6	11.50	8.58	78.6	11.73	9.21
74.7	11.51	8.60	78.7	11.73	9.22
74.8	11.51	8.61	78.8	11.74	9.24
74.9	11.52	8.63	78.9	11.74	9.26
75.0	11.52	8.64	79.0	11.74	9.27
75.1	11.53	8.66	79.1	11.75	9.29
75.2	11.53	8.67	79.2	11.75	9.31
75.3	11.54	8.69	79.3	11.76	9.33
75.4	11.55	8.70	79.4	11.76	9.34
75.5	11.56	8.72	79.5	11.77	9.35
75.6	11.56	8.73	79.6	11.78	9.37
75.7	11.57	8.75	79.7	11.78	9.38
75.8	11.57	8.77	79.8	11.79	9.40
75.9	11.58	8.79	79.9	11.79	9.41
76.0	11.58	8.80	80.0	11.80	9.43
76.1	11.58	8.81	80.1	11.80	9.45
76.2	11.59	8.83	80.2	11.81	9.47
76.3	11.59	8.85	80.3	11.82	9.48
76.4	11.60	8.86	80.4	11.82	9.49
76.5	11.60	8.87	80.5	11.83	9.51
76.6	11.61	8.89	80.6	11.83	9.53
76.7	11.62	8.91	80.7	11.84	9.55
76.8	11.62	8.92	80.8	11.84	9.57
76.9	11.63	8.93	80.9	11.85	9.59
77.0	11.63	8.95	81.0	11.85	9.60
77.1	11.64	8.97	81.1	11.86	9.61
77.2	11.64	8.99	81.2	11.87	9.63
77.3	11.65	9.00	81.3	11.87	9.65
77.4	11.65	9.02	81.4	11.88	9.67
77.5	11.66	9.04	81.5	11.89	9.69
77.6	11.67	9.05	81.6	11.89	9.70
77.7	11.68	9.06	81.7	11.90	9.72
77.8	11.68	9.08	81.8	11.90	9.74
77.9	11.69	9.09	81.9	11.91	9.76

MOLASSES.

TOTAL POUNDS AND POUNDS SOLIDS IN ONE GALLON.

Per Cent Solids.	Total Pounds per Gallon.	Pounds Solids per Gallon.	Per Cent Solids.	Total Pounds per Gallon.	Pounds Solids per Gallon.
82.0	11.91	9.77	84.5	12.05	10.18
82.1	11.92	9.79	84.6	12.06	10.20
82.2	11.92	9.81	84.7	12.06	10.22
82.3	11.93	9.82	84.8	12.07	10.23
82.4	11.93	9.84	84.9	12.08	10.25
82.5	11.94	9.86			
82.6	11.94	9.87	85.0	12.08	10.27
82.7	11.95	9.89	85.1	12.09	10.28
82.8	11.96	9.90	85.2	12.09	10.30
82.9	11.96	9.91	85.3	12.10	10.32
			85.4	12.11	10.34
83.0	11.97	9.93	85.5	12.11	10.35
83.1	11.97	9.95	85.6	12.12	10.37
83.2	11.98	9.97	85.7	12.12	10.39
83.3	11.98	9.98	85.8	12.13	10.40
83.4	11.99	10.00	85.9	12.13	10.42
83.5	12.00	10.02			
83.6	12.00	10.03	86.0	12.14	10.42
83.7	12.01	10.05	86.1	12.15	10.46
83.8	12.01	10.07	86.2	12.15	10.47
83.9	12.02	10.08	86.3	12.16	10.49
			86.4	12.16	10.50
84.0	12.02	10.10	86.5	12.17	10.52
84.1	12.03	10.12	86.6	12.17	10.54
84.2	12.04	10.13	86.7	12.18	10.56
84.3	12.05	10.15	86.8	12.19	10.58
84.4	12.05	10.17	86.9	12.19	10.60

MOLASSES.

TOTAL POUNDS AND POUNDS SOLIDS IN ONE GALLON AND IN ONE CUBIC FOOT.

Per Cent Solids.	Total Pounds per Gallon.	Total Pounds Solids per Gallon.	Total Pounds per Cubic Foot.	Pounds Solids per Cubic Foot.
87.0	12.20	10.61	91.49	79.60
87.1	12.21	10.63	91.53	79.72
87.2	12.21	10.65	91.38	79.85
87.3	12.22	10.66	91.62	79.98
87.4	12.22	10.68	91.66	80.11

MOLASSES.

TOTAL LBS., ETC., IN ONE GALLON AND IN ONE CUBIC FOOT.

Per Cent Solids.	Total Pounds per Gallon.	Total Pounds Solids per Gallon.	Total Pounds per Cubic Foot.	Pounds Solids per Cubic Foot.
87.5	12.23	10.70	91.70	80.24
87.6	12.24	10.72	91.75	80.37
87.7	12.24	10.74	91.79	80.50
87.8	12.25	10.75	91.83	80.63
87.9	12.25	10.77	91.87	80.76
88.0	12.26	10.79	91.92	80.89
88.1	12.26	10.81	91.96	81.02
88.2	12.27	10.82	92.00	81.15
88.3	12.27	10.84	92.05	81.28
88.4	12.28	10.86	92.10	81.41
88.5	12.28	10.87	92.14	81.54
88.6	12.29	10.89	92.18	81.67
88.7	12.29	10.91	92.22	81.80
88.8	12.30	10.93	92.27	81.93
88.9	12.30	10.94	92.32	82.06
89.0	12.31	10.96	92.36	82.20
89.1	12.32	10.98	92.40	82.33
89.2	12.32	11.00	92.45	82.46
89.3	12.33	11.01	92.49	82.59
89.4	12.33	11.03	92.54	82.72
89.5	12.34	11.05	92.58	82.85
89.6	12.35	11.07	92.63	82.98
89.7	12.35	11.09	92.67	83.11
89.8	12.36	11.10	92.71	83.24
89.9	12.36	11.12	92.76	83.37
90.0	12.37	11.14	92.80	83.52
90.1	12.38	11.16	92.85	83.65
90.2	12.38	11.18	92.89	83.78
90.3	12.39	11.19	92.94	83.91
90.4	12.39	11.21	92.98	84.04
90.5	12.40	11.23	93.03	84.17
90.6	12.41	11.25	93.07	84.30
90.7	12.41	11.27	93.11	84.43
90.8	12.42	11.28	93.16	84.56
90.9	12.43	11.30	93.20	84.69

MASSECUITE.

TOTAL POUNDS AND POUNDS SOLIDS IN ONE CUBIC FOOT.

Per Cent Solids.	Total Pounds per Cubic Foot.	Pounds Solids per Cubic Foot.	Per Cent Solids.	Total Pounds per Cubic Foot.	Pounds Solids per Cubic Foot.
91.0	93.25	84.86	94.0	94.60	88.92
91.1	93.29	84.98	94.1	94.64	89.05
91.2	93.34	85.12	94.2	94.69	89.18
91.3	93.38	85.25	94.3	94.73	89.32
91.4	93.43	85.39	94.4	94.78	89.45
91.5	93.47	85.52	94.5	94.83	89.58
91.6	93.53	85.66	94.6	94.87	89.72
91.7	93.58	85.79	94.7	94.92	89.85
91.8	93.64	85.93	94.8	94.96	89.99
91.9	93.68	86.06	94.9	95.00	90.13
92.0	93.72	86.22	95.0	95.05	90.30
92.1	93.76	86.34	95.1	95.10	90.43
92.2	93.79	86.47	95.2	95.14	90.58
92.3	93.82	86.60	95.3	95.19	90.71
92.4	93.89	86.75	95.4	95.23	90.85
92.5	93.92	86.88	95.5	95.28	90.99
92.6	93.97	87.01	95.6	95.32	91.13
92.7	94.00	87.15	95.7	95.37	91.27
92.8	94.06	87.28	95.8	95.42	91.40
92.9	94.10	87.42	95.9	95.46	91.54
93.0	94.15	87.56	96.0	95.51	91.69
93.1	94.19	87.69	96.1	95.56	91.83
93.2	94.24	87.83	96.2	95.60	91.97
93.3	94.28	87.97	96.3	95.65	92.11
93.4	94.33	88.11	96.4	95.69	92.25
93.5	94.37	88.25	96.5	95.74	92.39
93.6	94.42	88.39	96.6	95.79	92.53
93.7	94.46	88.52	96.7	95.83	92.67
93.8	94.51	88.65	96.8	95.88	92.81
93.9	94.55	88.79	96.9	95.92	92.95

CHAPTER V.

TABLE OF FACTORS

USED IN CALCULATING THE PERCENTAGE OF COMMERCIAL SUGAR RECOVERED FROM THE SUCROSE IN THE MASSECUITE.

The formula is:

$$\frac{\text{(Purity of massecuite} - \text{purity of molasses) factor}}{\text{Purity of massecuite}} = \text{per cent of commercial sugar.}$$

TABLE VII.

FACTORS USED IN CALCULATING THE PERCENTAGE OF COMMERCIAL SUGAR RECOVERED FROM THE SUCROSE IN THE MASSECUITE.

(Especially adapted for sugar refineries.)

Purity of Molasses.	Polarization of Sugar.			
	100.	99.5.	99.	98.5.
93.0	14.30	15.40	16.40	17.60
92.8	13.90	14.95	15.90	17.00
92.6	13.50	14.50	15.40	16.45
92.4	13.15	14.10	14.95	15.95
92.2	12.80	13.70	14.50	15.45
92.0	12.50	13.35	14.10	15.00
91.8	12.20	13.00	13.70	14.55
91.6	11.90	12.65	13.35	14.15
91.4	11.65	12.30	13.05	13.75
91.2	11.35	12.05	12.65	13.40
91.0	11.10	11.75	12.35	13.05
90.8	10.85	11.50	12.05	12.70
90.6	10.65	11.25	11.75	12.40
90.4	10.40	11.00	11.50	12.10
90.2	10.20	10.70	11.25	11.80
90.0	10.00	10.55	11.00	11.55
89.8	9.80	10.30	10.75	11.25
89.6	9.60	10.10	10.55	11.00
89.4	9.45	10.00	10.30	10.80
89.2	9.25	9.90	10.10	10.55
89.0	9.10	9.70	9.90	10.35
88.8	8.95	9.50	9.70	10.15
88.6	8.75	9.35	9.55	9.95
88.4	8.60	9.15	9.35	9.75
88.2	8.45	9.00	9.20	9.55
88.0	8.35	8.85	9.00	9.35
87.8	8.20	8.70	8.85	9.20
87.6	8.05	8.55	8.70	9.05
87.4	7.95	8.40	8.55	8.85
87.2	7.80	8.25	8.40	8.70
87.0	7.70	8.15	8.25	8.55
86.8	7.60	8.00	8.15	8.40
86.6	7.45	7.85	8.00	8.30
86.4	7.35	7.75	7.90	8.15
86.2	7.25	7.65	7.75	8.00
86.0	7.15	7.50	7.65	7.90
85.8	7.05	7.40	7.50	7.80
85.6	6.95	7.30	7.40	7.65
85.4	6.85	7.20	7.30	7.55
85.2	6.75	7.10	7.20	7.45
85.0	6.65	7.00	7.05	7.32

FACTORS USED IN CALCULATING THE PERCENTAGE OF COMMERCIAL SUGAR RECOVERED FROM THE SUCROSE IN THE MASSECUITE.

(Especially adapted for yellow clarified sugar.)

Purity of Molasses.	Polarization of Sugar.				
	100.	99.5.	99.	98.5.	98.
75	4.000	4.080	4.145	4.210	4.280
74	3.845	3.920	3.980	4.040	4.103
73	3.705	3.775	3.830	3.880	3.940
72	3.570	3.635	3.685	3.740	3.790
71	3.445	3.510	3 555	3.605	3.650
70	3.335	3.390	3.435	3 475	3.525
69	3.225	3.280	3.320	3.360	3.405
68	3.125	3.175	3.210	3.250	3.290
67	3.030	3.075	3.110	3.150	3.185
66	2.940	2.985	3.020	3.050	3.085
65	2.855	2.900	2.930	2.960	2.995
64	2.778	2.815	2.845	2.875	2.905
63	2.705	2.740	2.765	2.795	2.825
62	2.630	2.665	2.695	2.720	2.747
61	2.565	2.595	2.620	2.645	2.675
60	2.500	2.530	2.555	2.580	2.605
59	2.440	2.470	2.490	2.515	2.535
58	2.380	2.410	2.430	2.450	2.475
57	2.325	2.355	2.375	2.395	2.415
56	2.275	2.300	2.315	2.335	2.355
55	2.220	2.245	2.265	2.285	2.305
54	2.175	2.200	2.215	2.235	2.250
53	2.130	2.150	2.165	2.185	2.200
52	2.085	2.100	2.120	2.130	2.155
51	2.040	2.060	2.075	2.090	2.110
50	2.000	2.010	2.035	2.050	2.060
49	1.960	1.980	1.995	2.010	2.020
48	1.925	1.940	1.955	1.970	1.980
47	1.885	1.905	1.915	1.930	1.945
46	1.850	1.870	1.880	1.895	1.905
45	1.820	1.835	1.845	1.860	1.870
44	1.785	1.800	1.815	1.825	1.835
43	1.755	1.770	1.780	1.790	1.805
42	1.725	1.740	1.750	1.760	1.770
41	1.695	1.710	1.720	1.730	1.740
40	1.665	1.680	1.685	1.700	1.710

FACTORS USED IN CALCULATING THE PERCENTAGE OF COMMERCIAL SUGAR RECOVERED FROM THE SUCROSE IN THE MASSECUITE.

(Especially adapted for 96° sugar.)

Purity of Molasses.	Polarization of Sugar.					
	97.	96.5.	96.	95.5.	95.	94.5.
75	4.470	4.555	4.650	4.740	4.840	4.940
74	4.270	4.360	4.440	4.525	4.615	4.710
73	4.105	4.175	4.255	4.335	4.415	4.500
72	3.940	4.010	4.080	4.160	4.230	4.310
71	3.795	3.855	3.920	3.990	4.055	4.130
70	3.655	3.715	3.775	3.835	3.910	3.970
69	3.530	3.585	3.640	3.695	3.755	3.820
68	3.410	3.460	3.510	3.565	3.620	3.675
67	3.295	3.345	3.395	3.445	3.495	3.550
66	3.190	3.235	3.285	3.330	3.375	3.430
65	3.095	3.135	3.180	3.225	3.265	3.320
64	3.000	3.040	3.080	3.125	3.165	3.210
63	2.915	2.950	2.990	3.030	3.070	3.115
62	2.830	2.870	2.905	2.942	2.980	3.020
61	2.755	2.790	2.820	2.860	2.895	2.930
60	2.680	2.713	2.745	2.775	2.810	2.850
59	2.610	2.640	2.675	2.702	2.735	2.770
58	2.545	2.575	2.605	2.635	2.665	2.695
57	2.485	2.510	2.540	2.570	2.600	2.627
56	2.425	2.450	2.480	2.505	25.35	2.560
55	2.365	2.395	2.420	2.445	2.475	2.510
54	2 310	2.335	2.360	2.385	2.410	2.435
53	2 360	2.285	2.305	2.330	2.355	2.380
52	2.210	2.235	2.255	2.280	2.300	2.325
51	2.160	2.185	2.205	2.230	2.250	2.270
50	2.115	2.135	2.160	2.180	2.200	2.220
49	2.075	2.095	2.115	2.135	2.155	2.175
48	2.030	2.050	2.070	2.090	2.110	2.130
47	1.990	2.010	2.030	2.045	2.065	2.085
46	1.950	1.970	1.990	2.005	2.025	2.040
45	1.915	1.930	1.950	1.970	1.985	2.000
44	1.880	1.895	1.915	1.930	1.945	1.960
43	1.845	1.860	1.875	1.895	1.910	1.925
42	1.810	1.825	1.845	1.860	1.875	1.890
41	1.780	1.795	1.810	1.825	1.840	1.855
40	1.750	1.765	1.780	1.795	1.810	1.820
39	1.720	1.730	1.745	1.760	1.775	1.790

FACTORS USED IN CALCULATING THE PERCENTAGE OF COMMERCIAL SUGAR RECOVERED FROM THE SUCROSE IN THE MASSECUITE.

(Especially adapted for 96° sugar.)

Purity of Molasses.	Polarization of Sugar.					
	97.	96.5.	96.	95.5.	95.	94.5.
38	1.690	1.705	1.715	1.730	1.745	1.760
37	1.660	1.675	1.690	1.700	1.715	1.730
36	1.635	1.645	1.660	1.675	1.685	1.700
35	1.610	1.620	1.635	1.645	1.660	1.670
34	1.585	1.595	1.605	1.620	1.630	1.645
33	1.560	1.570	1.580	1.595	1.605	1.620
32	1.535	1.545	1.560	1.570	1.580	1.590
31	1.510	1.525	1.535	1.545	1.555	1.565
30	1.490	1.500	1.510	1.520	1.530	1.545
29	1.470	1.480	1.490	1.500	1.510	1.520
28	1.445	1.455	1.465	1.475	1.485	1.495
27	1.425	1.435	1.445	1.455	1.465	1.475
26	1.410	1.420	1.430	1.435	1.445	1.455
25	1.385	1.395	1.405	1.415	1.425	1.435
24	1.365	1.375	1.385	1.395	1.405	1.415

FACTORS USED IN CALCULATING THE PERCENTAGE OF COMMERCIAL SUGAR RECOVERED FROM SUCROSE IN THE MASSECUITE.

(Especially adapted for second sugar.)

Purity of Molasses.	Polarization of Sugar.						
	92.	90.	88.	86.	84.	82.	80
60	3.040	3.210	3.405	3.620	3.865	4.150	4.480
59	2.950	3.115	3.295	3 495	3.725	3.990	4.275
58	2 870	3.020	3 190	3.380	3.595	3.840	4.125
57	2 790	2.935	3.095	3.274	3.476	3.705	3.968
56	2 715	2 850	3 005	3 175	3.360	3.575	3.820
55	2 645	2 775	2 920	3 080	3.255	3.455	3.685
54	2.575	2 700	2.840	2 990	3.160	3.345	3.560
53	2 515	2.630	2.760	2.905	3.065	3.165	3.440
52	2 455	2.560	2.690	2 825	2.975	3.100	3.332
51	2.395	2.500	2 620	2.750	2.890	3.050	3.230
50	2 340	2 440	2.555	2.680	2.815	2.960	3.130
49	2 285	2 385	2 495	2.610	2 740	2.880	3.040
48	2 235	2 330	2 430	2 545	2.670	2.800	2.955
47	2 190	2 280	2.375	2.485	2.600	2.730	2.870
46	2.140	2 230	2.320	2.425	2 535	2.670	2.790
45	2 100	2.180	2.270	2.370	2.475	2.590	2 720
44	2 055	2 135	2 220	2.315	2.420	2.530	2.652
43	2.015	2 090	2 175	2.265	2 365	2.470	2 585
42	1.975	2 050	2.130	2 215	2.310	2 410	2.525
41	1.935	2.010	2 085	2.170	2.260	2.355	2.465
40	1 900	1.970	2.045	2 125	2 210	2.305	2 405
39	1.865	1 935	2 005	2 080	2 165	2.255	2.350
38	1 835	1.895	1 965	2.040	2 120	2.205	2.300
37	1 800	1 860	1 930	2 000	2.075	2.160	2.250
36	1 770	1 830	1.895	1 960	2.035	2.115	2.200
35	1 740	1 795	1 860	1 925	2 000	2 075	2.155
34	1.710	1 765	1 825	1 890	1 960	2.035	2.115
33	1.680	1 735	1.795	1 855	1 920	1.995	2.070
32	1 655	1 710	1 765	1 820	1 890	1.955	2 030
31	1 630	1 680	1.735	1.790	1 855	1 920	1.990
30	1.595	1 650	1.705	1 760	1 820	1 885	1 955
29	1.575	1 625	1 675	1 730	1 790	1.855	1.920
28	1.555	1.600	1 650	1 700	1.760	1 820	1.885
27	1.530	1 575	1 625	1 675	1.730	1 790	1 850
26	1.505	1.550	1 600	1 650	1.700	1 760	1.815
25	1 485	1 525	1 575	1 620	1.675	1 730	1.785
24	1.465	1 505	1.550	1 600	1 645	1.700	1.755

CHAPTER VI.

THE MOST PROFITABLE SUGAR TO MANUFACTURE.

A cane-sugar factory may manufacture:

I. Syrup.
II. 96° sugar and first molasses.
III. "YC" " " " "
IV. 96° " second sugar, and second molasses.
V. "YC" " " " " " "
VI. 96° " " " third sugar, and third molasses.
VII. "YC" " " " third sugar, and third molasses.

Which of these seven methods of treating the cane will yield the best financial returns is an open question that cannot be settled as long as the price of syrup, sugar, and molasses are subject to change.

The tables following are intended as a help in solving this problem. Having the daily market report for each product, knowing the cost of manufacture and the yield per ton, an up-to-date manager is able to calculate each morning whether or not he is manufacturing the product that will net him the largest financial returns.

YIELD OF SUGAR AND MOLASSES FOR EACH PER CENT OF SUCROSE FROM NINE TO FOURTEEN, FROM ONE TON OF CANE.

(Extraction 75 per cent.)

Case I.

Per Cent Sucrose.	Gallons Syrup 38° Beaumé.
9	21.2
10	22.6
11	23.9
12	25.0
13	26.1
14	27.2

Case II.

Per Cent Sucrose.	Pounds 96° Sugar.	Gallons First Molasses.
9	96.2	8.8
10	106.4	8.9
11	125.5	8.3
12	143.3	7.4
13	162.7	6.4
14	182.8	5.3

Case III.

Per Cent Sucrose.	Pounds "YC" Sugar.	Gallons First Molasses.
9	87.1	9.6
10	96.9	9.8
11	106.6	10.0
12	116.3	10.0
13	126.0	10.0
14	135.7	9.9

Case IV.

Per Cent Sucrose.	Pounds 96° Sugar.	Pounds Second Sugar.	Gallons Second Molasses.
9	96.2	12.5	7.5
10	106.4	19.3	7.1
11	124.5	17.8	6.5
12	143.3	16.0	5.8
13	162.7	13.9	5.1
14	182.8	11.5	4.2

YIELD OF SUGAR AND MOLASSES FOR EACH PER CENT OF SUCROSE FROM NINE TO FOURTEEN, FROM ONE TON OF CANE.

CASE V.

Per Cent Sucrose.	Pounds "YC" Sugar.	Pounds Second Sugar.	Gallons Second Molasses.
9	87.1	18.3	7.8
10	96.9	25.3	7.4
11	106.6	32.9	6.8
12	116.3	40.8	6.0
13	126.0	49.4	5.2
14	135.7	58.4	4.2

CASE VI.

Per Cent Sucrose.	Pounds 96° Sugar.	Pounds Second Sugar.	Per Cent Third Sugar.	Gallons Third Molasses.
9	96.2	12.5	9.4	6.6
10	106.4	19.3	8.9	6.2
11	124.5	17.8	8.2	5.7
12	143.3	16.0	7.4	5.1
13	162.7	13.9	6.4	4.4
14	182.8	11.5	5.3	3.7

CASE VII.

Per Cent Sucrose.	Pounds "YC" Sugar.	Pounds Second Sugar.	Pounds Third Sugar.	Gallons Third Molasses.
9	87.1	18.3	9.8	6.9
10	96.9	25.3	9.3	6.5
11	106.6	32.9	8.5	5.9
12	116.3	40.8	7.6	5.3
13	126.0	49.4	6.5	4.5
14	135.7	58.4	5.2	3.7

This calculation is best understood by an example. Suppose the daily market report was as follows:

Syrup	25c.	per gallon
96° sugar	$3\frac{3}{4}$c.	" pound
"YC" "	4c.	" "
2d "	3c.	" "
3d "	$2\frac{3}{4}$c.	" "
1st molasses	16c.	" gallon
2d "	12c.	" "
3d "	4c.	" "

and the cane yields a juice of 12 per cent sucrose.

Referring to the tables and applying the quotations the actual value of the product is determined.

Case I.

25 gallons of syrup @25c. . . . . = $6.25

Case II.

143.3 pounds of 96° sugar @$3\frac{3}{4}$c. . . . = $5.37
7.4 gallons of molasses @16c. . . . = 1.18

$6.55

Case III.

116.3 pounds "YC" sugar @4c. . . . = $4.65
10 gallons of 1st molasses @16c. . = 1.60

$6.25

Case IV.

143.3 pounds 96° sugar @ $3\frac{3}{4}$c.	=	$5.37
16 " 88° " @ 3c.	=	.48
5.8 gallons of 2d molasses @ 12c.	=	.70
		$6.55

Case V.

116.3 pounds "YC" sugar @ 4c.	=	$4.65
40.8 " 88° " @ 3c.	=	1.22
6 gallons 2d molasses @ 12c.	=	.72
		$6.59

Case VI.

143.3 pounds 96° sugar @ $3\frac{3}{4}$c.	=	$5.37
16 " 88° " @ 3c.	=	.48
7.4 " 88° " @ $2\frac{3}{4}$c.	=	.20
5.1 gallons 3d molasses @ 4c.	=	.20
		$6.25

Case VII.

116.3 pounds "YC" sugar @ 4c.	=	$4.65
40.8 " 88° " @ 3c.	=	1.22
7.6 " 88° " @ $2\frac{3}{4}$c.	=	.21
5.3 gallons 3d molasses @ 4c.	=	.21
		$6.29

TABLE SHOWING THE PROFIT MADE BY FOLLOWING EACH OF THE SEVEN METHODS.

	Value of Product.	Cost of Cane.	Cost of Manufacture.	Profit.
Case I.	$6.25	$3.00	$1.50	$1.75
" II.	6.55	3.00	1.75	1.80
" III.	6.25	3.00	1.75	1.50
" IV.	6.55	3.00	2.00	1.55
" V.	6.59	3.00	2.00	1.59
" VI.	6.25	3.00	2.25	1.00
" VII.	6.29	3.00	2.25	1.04

A careful study of this table, or better still, one similar, but using the real market quotations and cost of manufacture, will indicate the best method to follow during a grinding season.

TABLE VIII.

THIS TABLE SHOWS THE YIELD FROM 100 POUNDS OF SECOND SUGAR WHEN REMELTED AND MANUFACTURED INTO 96° SUGAR.

IN LOUISIANA.

Polarization of 100 lbs. Second Sugar.	Pounds 96° Sugar.	Gallons of Molasses.
80	76.36	2.04
82	79.37	1.77
84	82.32	1.52
86	85.14	1.27
88	88.15	1.01
90	91.10	.76
92	94.12	.50

IN CUBA.

Polarization of 100 lbs. Second Sugar.	Pounds 96° Sugar.	Gallons of Molasses.
80	71.53	2.51
82	75.10	2.19
84	78.74	1.87
86	82.25	1.56
88	85.78	1.25
90	89.32	.95
92	92.86	.63

Does it pay to melt second sugar?

Knowing the price of 96° sugar, second sugar, and extra cost of melting, the question can be answered satisfactorily by applying the figures to the yield indicated in the above table.

Price of 96° sugar, $3\frac{3}{4}$c.
" " 88° " 3c.

100	pounds 88° sugar @3c	=	$3.00	$3.00
88.15	" 96° " @$3\frac{3}{4}$c	=	$3.30	
1.01	gallon of molasses	=	.03	
	Total	=		$3.33
	Gain	=		.33

CHAPTER VII.

AVAILABLE SUGAR.

THE following tables give the pounds of available sugar—first, second, third, and total for each per cent of sucrose from 9 to 14. If a sample of juice contains 11.4 per cent sucrose and the mill extraction is 75 per cent, then the available total sugar is:

11 per cent.	=	147.7 lbs.
.4 " " (1.7×4)	=	6.8 "
11.4 per cent.	=	154.5 lbs.

In this case the first sugar is "YC" sugar and the second, 88° polarization.

TABLE IX.

YIELD OF SUGAR FROM ONE TON OF CANE.

JUICE CONTAINING NINE PER CENT SUCROSE.

Polarization of "YC" sugar..... 99°
" " second and third sugar..... 88°
Purity of final molasses..... 25°

Per Cent Extraction.	"YC" Sugar.	Second Sugar.	Third Sugar.	Total Sugar.	Pounds for Each 1/10% Sucrose.
68	79.1	16.6	8.9	104.6	1.46
69	80.2	16.8	9.0	106.0	1.49
70	81.4	17.1	9.2	107.7	1.50
71	82.6	17.3	9.3	109.2	1.52
72	83.7	17.6	9.4	110.7	1.55
73	84.8	17.8	9.6	112.2	1.57
74	85.9	18.1	9.7	113.7	1.60
75	87.1	18.3	9.8	115.2	1.63
76	88.2	18.5	10.0	116.7	1.65
77	89.4	18.8	10.1	118.3	1.67
78	90.6	19.0	10.2	119.8	1.69
79	91.7	19.3	10.3	121.3	1.72
80	92.9	19.5	10.5	122.9	1.73
81	94.1	19.7	10.6	124.4	1.75
82	95.3	20.0	10.8	126.1	1.77

JUICE CONTAINING TEN PER CENT SUCROSE.

Polarization of "YC" sugar..... 99°
" " second and third sugar..... 88°
Purity of final molasses..... 25°

Per Cent Extraction.	"YC" Sugar.	Second Sugar.	Third Sugar.	Total Sugar.	Pounds for Each 1/10% Sucrose.
68	87.9	22.9	8.4	119.2	1.49
69	89.1	23.3	8.4	120.8	1.52
70	90.4	23.6	8.5	122.5	1.54
71	91.7	23.9	8.6	124.2	1.57
72	93.0	24.3	8.7	126.0	1.59
73	94.3	24.6	8.8	127.7	1.61
74	95.6	25.0	8.9	129.5	1.63
75	96.9	25.3	9.0	131.2	1.65
76	98.2	25.6	9.1	132.9	1.68
77	99.5	26.0	9.2	134.7	1.70
78	100.8	26.3	9.3	136.4	1.73
79	102.0	26.7	9.4	138.1	1.75
80	103.3	27.0	9.5	139.8	1.77
81	104.6	27.3	9.6	141.5	1.80
82	105.9	27.7	9.7	143.3	1.81

YIELD OF SUGAR FROM ONE TON OF CANE.

JUICE CONTAINING ELEVEN PER CENT SUCROSE.

Polarization of "YC" sugar..... 99°
" " second and third sugar..... 88°
Purity of final molasses..... 25°

Per Cent Extraction.	"YC" Sugar.	Second Sugar.	Third Sugar.	Total Sugar.	Pounds for Each 1/10% Sucrose.
68	96.6	29.8	7.7	134.1	1.53
69	98.0	30.2	7.8	136.0	1.56
70	99.4	30.6	7.9	137.9	1.58
71	100.8	31.1	8.0	139.9	1.61
72	102.2	31.5	8.2	141.9	1.62
73	103.6	31.9	8.3	143.8	1.65
74	105.0	32.4	8.4	145.8	1.66
75	106.4	32.8	8.5	147.7	1.70
76	107.8	33.3	8.6	149.7	1.71
77	109.2	33.7	8.8	151.7	1.74
78	110.6	34.2	8.9	153.7	1.75
79	112.0	34.6	9.0	155.6	1.79
80	113.4	35.0	9.1	157.5	1.83
81	114.8	35.5	9.2	159.5	1.84
82	116.2	35.9	9.3	161.4	1.86

JUICE CONTAINING TWELVE PER CENT SUCROSE.

Polarization, etc., same as above.

Per Cent Extraction.	"YC" Sugar.	Second Sugar.	Third Sugar.	Total Sugar.	Pounds for Each 1/10% Sucrose.
68	105.4	37.1	6.9	149.4	1.56
69	107.0	37.6	7.0	151.6	1.58
70	108.5	38.1	7.1	153.7	1.61
71	110.1	38.7	7.2	156.0	1.62
72	111.6	39.2	7.3	158.1	1.64
73	113.2	39.7	7.4	160.3	1.67
74	114.7	40.2	7.5	162.4	1.71
75	116.3	40.8	7.6	164.7	1.72
76	117.8	41.3	7.7	166.8	1.75
77	119.4	41.9	7.8	169.1	1.76
78	120.9	42.4	7.9	171.2	1.80
79	122.5	42.9	8.1	173.5	1.81
80	124.1	43.5	8.2	175.8	1.82
81	125.6	44.0	8.3	177.9	1.85
82	127.1	44.5	8.4	180.0	1.88

YIELD OF SUGAR FROM ONE TON OF CANE.

JUICE CONTAINING THIRTEEN PER CENT SUCROSE.

Polarization of "YC" sugar..... 99°
" " second and third sugar..... 88°
Purity of final molasses..... 25°

Per Cent Extraction.	"YC" Sugar.	Second Sugar.	Third Sugar.	Total Sugar.	Pounds for Each 1/10% Sucrose.
68	114.2	44.8	5.9	164.9	1.59
69	115.9	45.5	6.0	167.4	1.60
70	117.6	46.1	6.1	169.8	1.62
71	119.2	46.8	6.2	172.2	1.64
72	120.9	47.4	6.2	174.5	1.68
73	122.6	48.1	6.3	177.0	1.70
74	124.3	48.8	6.4	179.5	1.72
75	126.0	49.4	6.5	181.9	1.75
76	127.6	50.1	6.6	184.3	1.77
77	129.3	50.7	6.7	186.7	1.80
78	131.0	51.4	6.8	189.2	1.81
79	132.7	52.1	6.8	191.6	1.83
80	134.4	52.7	6.9	194.0	1.86
81	136.0	53.4	7.0	196.4	1.89
82	137.7	54.0	7.1	198.8	1.91

JUICE CONTAINING FOURTEEN PER CENT SUCROSE.

Polarization, etc., same as above.

Per Cent Extraction.	"YC" Sugar.	Second Sugar.	Third Sugar.	Total Sugar.	Pounds for Each 1/10% Sucrose.
68	123.0	53.0	4.8	180.8	1.61
69	124.8	53.7	4.8	183.3	1.63
70	126.6	54.5	4.9	186.0	1.65
71	128.4	55.3	5.0	188.6	1.68
72	130.2	56.1	5.0	191.3	1.70
73	132.0	56.9	5.1	194.0	1.72
74	133.9	57.6	5.2	196.7	1.75
75	135.7	58.4	5.3	199.4	1.77
76	137.5	59.2	5.3	202.0	1.80
77	139.3	60.0	5.4	204.7	1.81
78	141.1	60.7	5.5	207.3	1.83
79	142.9	61.5	5.5	209.9	1.86
80	144.7	62.3	5.6	212.6	1.89
81	146.5	63.1	5.7	215.3	1.91
82	148.3	63.9	5.7	217.9	1.93

TABLE X.

YIELD OF SUGAR FROM ONE TON OF CANE.

JUICE CONTAINING NINE PER CENT SUCROSE.

Polarization of First sugar ..... 96°
" " second and third sugar ..... 88°
Purity of final molasses. ..... 25°

Per Cent Extraction.	"YC" Sugar.	Second Sugar.	Third Sugar.	Total Sugar.	Pounds for Each 1/10% Sucrose.
68	87.2	11.3	8.5	107.0	1.51
69	88.5	11.5	8.6	108.6	1.52
70	89.8	11.7	8.7	110.2	1.54
71	91.1	11.8	8.9	111.8	1.55
72	92.3	12.0	9.0	113.3	1.59
73	93.6	12.2	9.1	114.9	1.62
74	94.9	12.3	9.2	116.4	1.64
75	96.2	12.5	9.4	118.1	1.65
76	97.5	12.7	9.5	119.7	1.66
77	98.7	12.8	9.6	121.1	1.71
78	100.0	13.0	9.7	122.7	1.73
79	101.3	13.2	9.9	124.4	1.74
80	102.6	13.3	10.0	125.9	1.77
81	103.9	13.5	10.1	127.5	1.78
82	105.2	13.7	10.2	129.1	1.80

JUICE CONTAINING TEN PER CENT SUCROSE.

Polarization, etc., same as above.

Per Cent Extraction.	"YC" Sugar.	Second Sugar.	Third Sugar.	Total Sugar.	Pounds for Each 1/10% Sucrose.
68	96.5	17.5	8.1	122.1	1.44
69	97.9	17.7	8.2	123.8	1.47
70	99.3	18.0	8.3	125.6	1.49
71	100.7	18.2	8.4	127.3	1.51
72	102.2	18.5	8.5	129.2	1.53
73	103.6	18.8	8.7	131.1	1.55
74	105.0	19.0	8.8	132.8	1.57
75	106.4	19.3	8.9	134.6	1.59
76	107.8	19.5	9.0	136.3	1.61
77	109.3	19.8	9.1	138.2	1.63
78	110.7	20.0	9.3	140.0	1.66
79	112.1	20.3	9.4	141.8	1.68
80	113.5	20.6	9.5	143.6	1.70
81	114.9	20.8	9.6	145.3	1.72
82	116.3	21.1	9.7	147.1	1.75

YIELD OF SUGAR FROM ONE TON OF CANE

JUICE CONTAINING ELEVEN PER CENT SUCROSE.

Polarization of First sugar ..... 96°
" " second and third sugar..... 88°
Purity of final molasses..... 25°

Per Cent Extraction.	"YC" Sugar.	Second Sugar.	Third Sugar.	Total Sugar.	Pounds for Each 1/10% Sucrose.
68	112.9	16.1	7.5	136.5	1.46
69	114.5	16.4	7.6	138.5	1.48
70	116.2	16.6	7.7	140.5	1.50
71	117.8	16.9	7.8	142.7	1.52
72	119.5	17.1	7.9	144.5	1.54
73	121.2	17.3	8.0	146.5	1.58
74	122.8	17.6	8.1	148.5	1.60
75	124.5	17.8	8.2	150.5	1.62
76	126.1	18.0	8.3	152.4	1.65
77	127.8	18.3	8.4	154.5	1.66
78	129.5	18.5	8.6	156.6	1.67
79	131.1	18.8	8.7	158.6	1.69
80	132.8	19.0	8.8	160.6	1.72
81	134.4	19.2	8.9	162.5	1.75
82	136.1	19.5	9.0	164.6	1.77

JUICE CONTAINING TWELVE PER CENT SUCROSE.

Polarization, etc., same as above.

Per Cent Extraction.	"YC" Sugar.	Second Sugar.	Third Sugar.	Total Sugar.	Pounds for Each 1/10% Sucrose.
68	129.9	14.5	6.7	151.1	1.48
69	131.8	14.7	6.8	153.3	1.51
70	133.7	14.9	6.9	155.5	1.54
71	135.6	15.1	7.0	157.7	1.55
72	137.5	15.3	7.1	159.9	1.57
73	139.5	15.6	7.2	162.3	1.58
74	141.4	15.8	7.3	164.5	1.60
75	143.3	16.0	7.4	166.7	1.63
76	145.2	16.2	7.5	168.9	1.66
77	147.1	16.4	7.6	171.1	1.69
78	149.0	16.6	7.7	173.3	1.70
79	150.9	16.8	7.8	175.5	1.72
80	152.8	17.1	7.9	177.8	1.74
81	154.7	17.3	8.0	180.0	1.76
82	156.7	17.5	8.1	182.3	1.78

YIELD OF SUGAR FROM ONE TON OF CANE.

JUICE CONTAINING THIRTEEN PER CENT SUCROSE.

Polarization of Frist sugar ..... 96°
" " second and third sugar..... 88°
Purity of final molasses. ..... 25°

Per Cent Extraction.	"YC" Sugar.	Second Sugar.	Third Sugar.	Total Sugar.	Pounds for Each 1/10% Sucrose.
68	147.5	12.6	5 8	165.9	1.50
69	149.7	12 8	5 9	168 4	1.52
70	151.9	13.0	6 0	170.9	1.53
71	154.0	13 1	6 1	173.2	1.56
72	156.2	13.3	6.1	175.6	1.60
73	158.4	13.5	6.2	178.1	1 62
74	160.5	13.7	6.3	180.5	1.63
75	162.7	13.9	6.4	183.0	1.66
76	164.9	14.1	6.5	185.5	1.67
77	167.1	14.3	6.6	188.0	1.69
78	169.2	14.4	6.7	190.3	1.72
79	171 4	14.6	6.7	192.7	1.75
80	173.6	14.8	6.8	195.2	1.77
81	175.7	15.0	6.9	197.6	1.79
82	177 9	15.2	7.0	200.1	1.81

JUICE CONTAINING FOURTEEN PER CENT SUCROSE.

Polarization, etc., same as above.

Per Cent Extraction.	"YC" Sugar.	Second Sugar.	Third Sugar.	Total Sugar.	Pounds for Each 1/10% Sucrose.
68	165.7	10.4	4.8	180.9	1.52
69	168.2	10.5	4.9	183.6	1.54
70	170.6	10.7	4.9	186.2	1.56
71	173.0	10.8	5.0	188.8	1.59
72	175.5	11	5.1	191.6	1.62
73	177.9	11.2	5.2	194.3	1.64
74	180.3	11.3	5 2	196.8	1.66
75	182.8	11.5	5.3	199.6	1.67
76	185.2	11.6	5.4	202.2	1.69
77	187.7	11.8	5.4	204.9	1.72
78	190.1	11.9	5.5	207.5	1.74
79	192.6	12.1	5.6	210.3	1.77
80	195.0	12.2	5.7	212.9	1.79
81	197.4	12.4	5.7	215.5	1.81
82	199.8	12.6	5.8	218.2	1.83

TABLE XI.

"RENDIMIENTO."

FOURTEEN PER CENT SUCROSE.

Polarization of First sugar..... 96°

FOR USE IN CUBA.

Per Cent Extraction.	Purity of Final Molasses.					1/10 of One Per Cent.
	30.	35.	40.	45.	50.	
68	8.83	8.67	8.50	8.29	8.02	.071
69	8.96	8.80	8.62	8.41	8.14	.072
70	9.10	8.93	8.75	8.53	8.25	.073
71	9.23	9.06	8.87	8.65	8.36	.074
72	9.36	9.19	9.00	8.78	8.49	.075
73	9.48	9.32	9.12	8.90	8.61	.076
74	9.61	9.45	9.25	9.02	8.73	.077
75	9.74	9.58	9.37	9.14	8.85	.078
76	9.87	9.70	9.50	9.27	8.96	.079
77	9.90	9.83	9.62	9.39	9.08	.080
78	10.13	9.96	9.75	9.51	9.21	.081

"RENDIMIENTO."

FIFTEEN PER CENT SUCROSE.

Polarization of First sugar.....96°

Per Cent Extraction.	Purity of Final Molasses.					1/10 of One Per Cent.
	30.	35.	40.	45.	50.	
68	9.53	9.38	9.21	8.99	8.75	.072
69	9.66	9.52	9.34	9.12	8.80	.073
70	9.80	9.66	9.47	9.25	8.96	.074
71	9.94	9.80	9.61	9.37	9.09	.075
72	10.09	9.93	9.75	7.52	9.23	.076
73	10.21	10.07	9.89	9.65	9.37	.077
74	10.34	10.22	10.02	9.78	9.50	.078
75	10.49	10.35	10.15	9.91	9.64	.079
76	10.65	10.48	10.28	10.02	9.77	.080
77	10.79	10.61	10.41	10.18	9.89	.081
78	10.93	10.75	10.55	10.32	10.03	.082

"RENDIMIENTO."

SIXTEEN PER CENT SUCROSE.

Polarization of First sugar..... 96°

Per Cent Extraction.	Purity of Final Molasses.					1/10 of One Per Cent.
	30.	35.	40.	45.	50.	
68	10.22	10.08	9.92	9.71	9.48	.073
69	10.37	10.23	10.07	9.86	9.62	.074
70	10.52	10.38	10.22	10.00	9.76	.075
71	10.67	10.55	10.37	10.14	9.90	.076
72	10.82	10.68	10.51	10.28	10.04	.077
73	10.97	10.83	10.66	10.33	10.18	.078
74	11.12	10.98	10.80	10.57	10.32	.079
75	11.27	11.13	10.95	10.71	10.46	.080
76	11.42	11.27	11.09	10.85	10.60	.081
77	11.57	11.42	11.24	10.99	10.74	.082
78	11.72	11.57	11.38	11.14	10.88	.083

"RENDIMIENTO."

SEVENTEEN PER CENT SUCROSE.

Polarization of First sugar..... 96°

Per Cent Extraction.	Purity of Final Molasses.					1/10 of One Per Cent.
	30.	35.	40.	45.	50.	
68	10.92	10.80	10.65	10.46	10.23	.072
69	11.08	10.96	10.80	10.61	10.38	.074
70	11.24	11.11	10.95	10.76	10.53	.075
71	11.39	11.27	11.11	10.91	10.68	.076
72	11.55	11.42	11.27	11.07	10.83	.077
73	11.71	11.58	11.42	11.22	10.98	.078
74	11.87	11.73	11.57	11.37	11.12	.079
75	12.03	11.89	11.72	11.52	11.27	.080
76	12.19	12.04	11.88	11.67	11.42	.081
77	12.35	12.20	12.03	11.82	11.57	.082
78	12.52	12.35	12.19	11.98	11.71	.083

RENDIMIENTO."

EIGHTEEN PER CENT SUCROSE.

Polarization of First sugar ..... 96°

Per Cent. Extraction.	Purity of Final Molasses.					1/10 of One Per Cent.
	30.	35.	40.	45.	50.	
68	11.63	11.52	11.37	11.19	10.99	.075
69	11.79	11.68	11.53	11.35	11.14	.076
70	11.96	11.84	11.70	11.51	11.30	.078
71	12.13	12.01	11.86	11.67	11.46	.079
72	12.30	12.17	12.03	11.83	11.62	.080
73	12.46	12.33	12.19	11.99	11.77	.082
74	12.63	12.50	12.35	12.16	11.93	.084
75	12.79	12.66	12.51	12.32	12.09	.086
76	12.96	12.83	12.68	12.48	12.25	.087
77	12.13	12.99	12.84	12.64	12.40	.088
78	13.50	13.16	13.02	12.81	12.56	.089

"RENDIMIENTO."

NINETEEN PER CENT SUCROSE.

Polarization of First sugar ..... 96°

Per Cent. Extraction.	Purity of Final Molasses.					
	30.	35.	40.	45.	50.	
68	12.35	12.25	12.12	11.96	11.77	
69	12.53	12.43	12.30	12.14	11.91	
70	12.71	12.61	12.48	12.31	12.11	
71	12.89	12.79	12.66	12.59	12.28	
72	13.08	12.97	12.83	12.66	12.46	
73	13.26	13.15	13.01	12.84	12.64	
74	13.45	13.33	13.19	13.01	12.82	
75	13.63	13.51	13.37	13.19	12.98	
76	13.80	13.69	13.55	13.36	13.15	
77	13.98	13.87	13.73	13.54	13.33	
78	14.17	14.05	13.90	13.71	13.50